the *Andalusite* group may be noted. All these cases may be capable of some other explanations, but I cite them to show that such excesses are commonly met with in published analyses. On the other hand, it is scarcely to be doubted that a good analyst, who obtained a really significant excess, would throw such a result aside as erroneous and never publish it. I therefore plead for much greater care in analyses of the kind in question, and closer scrutiny of results in the light of the suggestions I have ventured to offer. It is probable that silicates containing only partially oxidised aluminum are rare; nevertheless the search for them would introduce a new element of interest into mineralogical inquiries.

If the general considerations I have now endeavoured to lay before you are allowed their full weight, some of the alumino-silicates of our primary rocks reveal to us more than we hitherto supposed. Regarded from this newer standpoint, they are teleoxidised representatives of substances which foreshadowed in terms of silicon, aluminum, and oxygen the compounds of carbon, nitrogen, and hydrogen required at a later stage of the earth's history for living organisms. Thus, while the sedimentary strata contain remains which come down to us from the very dawn of life on this globe, the rocks from whose partial disintegration the preserving strata resulted contain mineral records which carry us still further back, even to Nature's earliest efforts in building up compounds similar to those suited for the purposes of organic development.

NOTES.

PROF. MAX MÜLLER has attained the jubilee of his Doctorate, having taken his degree in 1843, and in honour of the occasion the University of Leipzig has conferred a new diploma upon him.

MR. BELL, of Carlton Street, Nottingham, has brought out, at an opportune moment, "A Contribution to the Geology and Natural History of Nottinghamshire." The little volume is edited by Mr. J. W. Carr, who in his preface records his indebtedness to various friends—specialists in certain departments—who wrote for him some portions of the book. The book was compiled at the request of the Local Excursions' Committee of the British Association, for the use of members attending the Nottingham meeting. We have no doubt that many such will avail themselves of the handy little guide-book, which has been prepared for their special benefit.

THERE seems to be no doubt that the latest report of the death of Emin Pasha is to be relied upon. Mr. A. J. Swann, of Ujiji, from whom the report comes, declares that in his opinion it is as conclusive as anything can be in Africa. And now within a week of the tidings of Emin's death the sudden decease is announced of another African traveller—Surgeon-Major Parke—one of the most widely-known of the members of the Emin Relief Expedition. He died suddenly on the night of Sunday last, while on a visit to the seat of the Duke of St. Albans at Alt-na-Craig.

THE death is announced, at the age of sixty-one, of Dr. Alexander Strauch, the Director of the Zoological Museum of St. Petersburg. Dr. Strauch was an authority on reptiles, and the author of several zoological works.

THE death is reported of Mr. T. W. Kennard, C.E., founder of the Monmouthshire Crumlin Works, designer and constructor of the Crumlin Viaduct, and engineer-in-chief of the Atlantic and Great Western Railway, United States. He died at the age of 68.

WE have to record the death of a well-known inventor and civil engineer of New York, in the person of Mr. Joseph Battin. He was in his 87th year.

ON and after November 1 next, the railway time throughout the kingdom of Italy will, according to a recent Act of the Legislature, be regulated by the mean solar time of the 15th meridian east of Greenwich, this being the so-called Middle European time. The hours will be reckoned from midnight to midnight. The new time will be 11 minutes in advance of the mean solar time of Rome. It is expected that the other services and the Italian public generally will soon follow the example set by the railway stations.

M. D'ARSONVAL, in *Électricité* for August 24, describes some experiments which he has made on the effects of strong, alternating magnetic fields on animals, his results apparently being somewhat contradictory to those recently obtained in the Edison Laboratory. M. D'Arsonval's experiments were performed by means of coils wound on cylinders of cardboard, glass or wood, large enough to accommodate a man inside them when required. The solenoid thus formed constituted the path for the discharge of a condenser of two to twelve Leyden jars, arranged in two batteries with proper precautions for rendering the discharge oscillatory. The jars were charged periodically by a transformer, giving a current at about 15,000 volts, with a frequency of sixty per second. A lamp held with one terminal in each hand of a man standing within the solenoid, may then be raised by the induced currents to bright incandescence, while M. D'Arsonval asserts that considerable physiological effects are also produced. The method used to determination the strength of these alternating magnetic fields is very ingenious; it consists simply in inserting a mercurial thermometer in the field, and noting the rise of temperature produced by the Foucault currents in the mercury. A considerable rise is very quickly produced in the strongest fields, while for weaker fields a petroleum thermometer is employed, or an air thermometer the bulb of which contains a small copper tube.

DR. W. S. HEDLEY, in an article in the *Lancet*, comments on M. D'Arsonval's work, and mentions some experiments of his own which seem to support the hypothesis that the harmlessness of high frequency alternating currents may be explained by the fact that in these cases there is "virtually no current strength"; *e.g.*, a current of two amperes at 200 volts, if transformed up to 100,000 volts, cannot exceed in strength 0·004 ampere. Another factor concerned in the effect is the "concentration" of the current. Passing a current of high frequency and capable of keeping a 5-candle lamp glowing, through the body by means of copper cylinders held in the hands, produced no appreciable effect beyond a slight warming under the electrodes; using a half-crown as electrode on the forearm, the same negative result follows; with a shilling, there is a slight pricking effect, which becomes quite painful with a threepenny-piece substituted for the shilling, thus indicating that other factors have to be considered, as well as more frequency, in the discussion of the "harmlessness" of alternating currents.

THE issue in a compact form of the interesting series of articles on "Sewage Purification in America," by M. N. Baker, which appeared in the *Engineering News* of New York last year, furnishes an important addition to our information on this complicated subject. The treatment of the sewage of thirty municipalities in the United States and Canada is given in detail, and the description further elucidated by no less than seventy-seven illustrations, including elaborate plans showing the various arrangement of purification, plant, &c. The little pamphlet of 196 pages is well printed and is provided with a copious index. That America has recently devoted much attention to the vexed question of the purification of sewage will be remembered by all who have had occasion to consult the admirable experimental work on the chemical and bacteriological aspects of this subject, conducted at the instigation and under the superintendence of the Massachusetts State Board of Health.

"CHEMICAL and Micro-Mineralogical Researches on the Upper Cretaceous Zones of the South of England" is the title of the thesis sent in by Dr. W. F. Hume for the recent D.Sc. examination at London University. This paper gives a large amount of information on the subject; the zones described being those established by Dr. C. Barrois. The notes refer chiefly to the chalk of the Isle of Wight and Dorsetshire, but they include numerous references to the chalk of other areas, especially to that of Folkestone. The author's researches incline him to the belief that most of the chalk was deposited in fairly deep water; thus differing from M. Cayeux, whose work in the north of France led him to infer a shallow water origin for the chalk of that area. The insoluble residue decreases in quantity as we ascend in the series, and is generally greater in the Isle of Wight than at Folkestone; the excess being especially apparent in the Cenomanian zones. All the Upper Cenomanian beds have undergone secondary silicification.

THE Geological Survey of France has now published rather more than one-half of the country on the scale of 1 : 80,000—138 streets out of a total of 259. An excellent general map on the scale of 1 : 1,000,000 was issued in 1889. The first street (No. 13) of the map on the scale of 1 : 320,000 has just been published. This map, which is a reduction of sixteen streets on the larger scale, has Paris nearly in the centre, and includes Honfleur and Liseaux on the west, Chateaudun and Sens on the south, Nogent and Dormans on the east, Rouen and Beauvais on the north. The tertiary and secondary rocks are well represented within this area, the Silurian, Ordovieian, Cambrian and pre-Cambrian occupying a small space on the south-west, near Mamers. The clay with flints is shown by shading over the chalk. The freshwater and estuarine strata are indicated by shading over the colour denoting the geological formations. Numerous notes on economic geology are printed below the map.

AN interesting study of the compounds of phosphorus and sulphur, by Herr Helff, is published in the current number of the *Zeitschrift für physikalische Chemie*. Hitherto seven sulphides of phosphorus have been described. Observations on vapour-density, and on the boiling-point of solutions in carbon bisulphide indicate, however, that four of these only are true chemical compounds, viz. P_4S_3, P_4S_7, P_3S_6, and P_2S_5. On heating two atomic proportions of phosphorus with three of sulphur, instead of P_2S_3 being formed it appears that the main product is P_4S_7, a little P_4S_3 being also obtained. The substances previously taken to be P_4S and P_4S_2 are merely solutions of sulphur in phosphorus. Incidentally the author confirms the results already arrived at by Beckmann, that when in solution in carbon bisulphide, sulphur has the molecular formula S_8 and phosphorus the formula P_4; he also shows that phosphorus and sulphur when dissolved in carbon bisulphide do not unite even on heating to the ordinary boiling-point. It is also noteworthy that the freezing-points of solutions of sulphur in phosphorus favour the view that here the molecular complexity of sulphur is the same as when it is dissolved in carbon bisulphide.

THE eighth meeting of the International Congress of Hygiene and Demography is to be held during the present month at Buda Pesth, and several international committees have, we understand, been formed with a view to carrying out the decisions of the London Congress. A separate section for tropical countries has been organised, and will meet under the presidency of Dr. Theodor Duka.

THE sixteenth annual meeting of the Library Association was held at Aberdeen on September 4 and 5. In his inaugural address, Dr. Garnett, Keeper of the Printed Books in the British Museum, dwelt upon the cataloguing of books. He said that a catalogue should not merely enable the reader to find a book with the least possible delay, but also present an epitome of the life-work of every author, and assist the literary historian in his researches. Of the papers read, one by Prof. Trail, on "The Classification of Books in the Natural Sciences," was of especial scientific interest.

SEVERAL very interesting lectures will shortly be delivered at the evening meetings of the Camera Club. On September 21 Prof. J. Milne, F.R.S., who is on a short visit from Japan, will discourse upon "The Earthquakes of Japan"; Mr. Lamond Howie will give a lecture, entitled "The Scottish Alps," on September 28; and the October and November programmes will include a paper by Prof. Marshall Ward, F.R.S.

THE Journal of the College of Science, Imperial University, Japan, vol. vi. part 2, is devoted to a paper by Mr. Sadahisa Matsuda on "The Anatomy of Magnoliaceæ." The author splits up *Magnoliaceæ* into the four following groups: (1) Those identical with *Magnolieæ*, (2) those identical with *Schizandreæ* (3) *Trochodendron* and the genera of *Illicieæ*, (4) *Eupteleæ* and *Cercidiphyllum*.

A REVISED report on the "Copepoda of Liverpool Bay," by Mr. Isaac C. Thompson, has been published in the Transactions of the Liverpool Biological Society, vol. vii. The report deals with 136 species, eighteen of which are new to the district over which the collection was made, and eleven are considered to be entirely new species. Twenty plates are included, containing a number of outline sketches for facilitating identification.

THE Anthropological Institute has issued an index to its publications. The index includes communications published in the journal and transactions of the Ethnological Society from 1843 to 1871; those in the journal and memoirs of the Anthropological Society (1863-71), and also those that have appeared in the *Anthropological Review*. In 1871 the Ethnological and Anthropological Societies united to form the Anthropological Institute, and since then all papers have appeared in the Institute's journal. The first twenty volumes of the journal are included in the index.

Cosmos contains an article by M. C. Maze, from which it appears that droughts such as we have experienced this year follow a cycle of forty-two years. Since, however, the observations discussed have not been obtained from one place, and there is no clear definition as to what constitutes a dry season, the theory can hardly be said to be above suspicion.

MESSRS. TAYLOR AND FRANCIS will shortly publish a work, by Griffith Brewer and Patrick Y. Alexander, on "Aëronautics," being an abridgement of aëronautical specifications filed at the Patent Office between 1851 and 1891.

MESSRS. G. P. PUTMAN'S SONS have published for Dr. Lauro Sodré, the Governor of Pará, Brazil, a work on "The State of Pará." The work is in five parts, by different contributors, dealing respectively with the history of Pará, physical features, public instruction, revenues and commerce, and industries.

THE *Journal of the Franklin Institute* for September contains among other things the continuation of Nikola Tesla's lecture "On Sight and other High Frequency Phenomena," and the conclusion of the lecture, by Dr. Richards, on "The Specific Heats of the Metals."

THE Calendar of the University College, Bristol, for the session 1893–94 has just been issued through Mr. Arrowsmith, of Bristol.

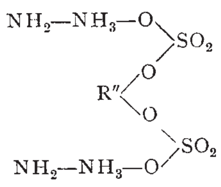
PROF. KINCH, of the Royal Agricultural College, Cirencester, has just issued a report of some of his field experiments for 1892 and 1893.

MR. W. F. STANLEY, of Great Turnstile, Holborn, has sent us the new edition of his catalogue of mathematical instruments made and sold by him. It is excellently printed upon good paper, and is very admirably classified.

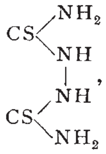
THE U.S. Department of Agriculture, division of Entomology, has lately brought out Vol. v., No. 5, of "Insect Life."

WE are informed by a correspondent that the Rev. L. Blomefield, whose death we recorded in last week's NATURE, was in his ninety-fourth year, and not, as stated by us, in his ninety-first.

FURTHER information concerning hydrazine, N_2H_4, and its compounds is contained in an inaugural dissertation by one of Prof. Curtius's assistants at Kiel, Herr Franz Schrader, and a brief account of it will be found in the current *Chemiker Zeitung*. A considerable time has now elapsed since the first preparation of hydrazine, which was announced by Prof. Curtius in June, 1887, and it is almost three years since full details were published concerning the isolation of the pure hydrate, a liquid of the composition $N_2H_4.H_2O$ which boils at 119°. It was then stated (vide NATURE, vol. 43, p. 205) that in closed vessels this hydrate may be preserved unaltered for any length of time. The experience of the last three years, however, necessitates a modification of that statement, and Herr Schrader now informs us that the liquid stored in sealed tubes decomposes sooner or later, the principal product of decomposition being ammonium hydrate. No gas appears to be generated during the process, so that tubes containing it do not become dangerous from accumulation of pressure. The reactions between the hydrate and a large number of metallic oxides are described, in which the strong reducing proclivities of hydrazine are very markedly exhibited, the reaction being frequently of an explosive character. Herr Schrader further describes a series of double sulphates containing hydrazine sulphate and the sulphate of a metal. Their general formula is $R''SO_4.(N_2H_4)_2H_2SO_4$ where R'' may represent copper, nickel, cobalt, iron, manganese, zinc and cadmium. These double sulphates, which contain no water of crystallisation, and are further distinguished from the double sulphates containing ammonium by their difficult solubility, are readily prepared by the admixture of solutions of the constituent simple sulphates. The constitution of the salts is probably expressed by the formula,



Considerable difficulty was found in preparing double chlorides of fixed composition containing hydrazine-chloride. Good crystals of very soluble double chlorides are easily obtained, but so many appear capable of existence that the conditions for the formation of salts of definite constitution have not yet been ascertained. Two entirely new compounds of hydrazine are described by Herr Schrader. By saturating hydrazine hydrate with sulphocyanic acid, or by decomposing hydrazine sulphate with barium sulphocyanate, hydrazine sulphocyanate, $N_2H_4.HSCN$, is obtained as a deliquescent solid substance which melts at 80°. When this hydrazine sulpho cyanate is heated, or when molecular proportions of hydrazine dichloride $N_2H_4.2HCl$ and ammoniumsulpho cyanate in aqueous solution are heated for four or five hours in a sealed tube to 100°, a second new substance of urea-like constitution



is formed. This second substance, hydrazine sulphocarbamide crystallises well from solution in hot water and melts at 214–215°. Its properties are somewhat remarkable, inasmuch as it appears to possess fairly strong acid properties, its solution yielding very characteristic precipitates with solutions of most metallic salts. The dissertation of Herr Schrader likewise reviews most of the work which has been carried out in the Kiel laboratories in connection with hydrazine, and adds many little details of importance in the practical manipulation of the substance and its compounds.

NOTES from the Marine Biological Station, Plymouth.—Last week's captures include the Actinian *Zoanthus Couchii* and the Archiannelid *Histriobdella Homari*. In the floating fauna *Noctiluca*, *Obelia* medusæ, Cirrhipede *Nauplii* and Caridid larvæ were plentiful; *Sagitta*, *Oikopleura* and the tubicolous larvæ of *Terebella* were fairly numerous. Specimens were also taken of the Leptomedusæ *Willia stellata* and *Eucopium quadratum*, of young stages of *Geryonia*, of *Doliolum Tritonis* and Ascidian larvæ, and of the larvæ of the Gephyrean *Thalassema*. The Nemertine *Amphiporus pulcher* and the Mollusc *Goniodoris castanea* are now breeding.

THE additions to the Zoological Society's Gardens during the past week include a Sooty Mangabey (*Cercocebus fuliginosus*, ♀) from West Africa, presented by Miss Grimston; two Brazilian Cariamas (*Cariama cristata*) from Brazil, presented by Mr. Lindsay C. Scott; a Melodious Jay Thrush (*Leucodioptron canorum*) from China, presented by Mr. B. H. Jones, F.Z.S.; a Wall Lizard (*Lacerta muralis* var. *taliguerta*) from Triest, presented by Mr. A. W. Arrowsmith; a Chilian Teal (*Querquedula creccoides*) from Antarctic America, a Little Tern (*Sterna hirundo*) from Brit. Isles, an Axis Deer (*Cervus axis*, ♂) from India, and a St. Thomas's Conure (*Conurus pertinax*) from West Indies, purchased.

OUR ASTRONOMICAL COLUMN.

MR. TEBBUTT'S OBSERVATORY.—We have received from Mr. Tebbutt the report of the work that has been done during the year 1892 at his observatory. In addition to meridian observations a great many extra-meridian observations were made, among which we may name the following:—Forty-five phases of occultations of stars by the moon, several observations of the phenomena of Jupiter's satellites, twenty good comparisons of the planet Mars, when in conjunction with Iota Aquarii, with that star, by means of the filar micrometer on the 8-inch equatorial, numerous observations of the comets visible in that year, about fifteen double-star measures and the variable star observations, including a few comparisons of η Argus and R. Carinæ with neighbouring stars. The meteorological observations have been regularly taken. Under the heading "Personal Establishment," an idea of the energy and zeal which Mr. Tebbutt shows for this science can be gathered from the fact that all the astronomical, and nearly all the meteorological observations are made by himself. Occasionally his son takes the meteorological readings during his absence from home, while the assistance of a computer is sometimes made use of. Although Mr. Tebbutt has received from several as-